

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Bee Lee CHUA,  
et al. ) RE: Preliminary Amendment  
          ) )  
          ) )  
Serial No.: Not yet assigned ) ) Our Ref: B-4445 619419-0  
          ) )  
Filed: Concurrently herewith ) )  
          ) )  
For: "VIBRATORY IN-PLANE ) )  
TUNNELLING GYROSCOPE" ) Date: January 2, 2002

Commissioner of Patents and Trademarks  
Box New Patent Application  
Washington, D.C., 20231

Sir:

Prior to examination of the above-identified application, it is respectfully requested that the following amendments be made to the Claims:

IN THE CLAIMS

Please replace original Claims 4-7, 10, 13-15, 17-18, 23, 25-26, 29, 32-33, and 36-38 with amended Claims 4-7, 10, 13-15, 17-18, 23, 25-26, 29, 32-33, and 36-38, which are set forth below.

(Appendix A, which is enclosed herewith, shows how original Claims 4-7, 10, 13-15, 17-18, 23, 25-26, 29, 32-33, and 36-38 were amended to produce amended Claims 4-7, 10, 13-15, 17-18, 23, 25-26, 29, 32-33, and 36-38.)

4. (Amended) A gyroscope according to Claim 2, wherein at least one of the means to cause the proof masses to oscillate comprises at least one electrostatic oscillation actuator.

5. (Amended) A gyroscope according to Claim 2, wherein at least one of the means to cause the proof masses to oscillate comprises at least one current-carrying element oriented in the other of the

first of the second direction, a magnetic field being provided in a direction perpendicular to the first and second directions.

6. (Amended) A gyroscope according to Claim 1, wherein at least one of the connection arrangements comprises at least one suspension beam extending between the proof mass and the frame.

7. (Amended) A gyroscope according to Claim 1, wherein at least one of the constituent gyroscopes comprises an anchor, the frame of the constituent gyroscope being connected to the anchor.

10. (Amended) A gyroscope according to Claim 8, further comprising means to vary the distance between the positioner and the frame.

13. (Amended) A gyroscope according to Claim 1, wherein one of at least one of the pairs of elements is located on the frame of the respective constituent gyroscope, the other of the at least one of the pairs of elements being located on the proof mass of the respective constituent gyroscope.

14. (Amended) A gyroscope according to Claim 8, wherein one of the pair of elements on the at least one constituent gyroscope is located on the positioner, the other of the pair of elements being located on the frame of the at least one constituent gyroscope.

15. (Amended) A gyroscope according to Claim 1, wherein at least one of the constituent gyroscopes comprises a further proof mass.

17. (Amended) A gyroscope according to Claim 1, wherein the sensed relative motion between each of the pairs of elements is used to maintain a predetermined distance between the elements of each pair of elements.

18. (Amended) A gyroscope according to Claim 1, wherein the respective pairs of elements are adapted to sense motion in collinear directions.
23. (Amended) A gyroscope according to Claim 20, wherein the frame and the proof mass are connected to one another by the connection arrangement such that, during oscillation of the proof mass in the second direction, the proof mass suffers an angular deflection with respect to the frame.
25. (Amended) A gyroscope according to Claim 19, wherein one of the pair of elements comprises a quantum tunnelling sensing tip, the other of the pair of elements comprising an electrode.
26. (Amended) A gyroscope according to Claim 19, further comprising a positioner located adjacent the frame.
29. (Amended) A gyroscope according to Claim 27, wherein means are provided to vary the distance between the positioner and the frame.
32. (Amended) A gyroscope according to Claim 26, wherein one of the pairs of elements is located on the positioner, the other pair of elements being located on the frame.
33. (Amended) A gyroscope according to Claim 19, wherein one of the pair of elements is located on the frame, the other of the pair of elements being located on the proof mass.
36. (Amended) A gyroscope according to Claim 29, wherein the one of the pair of elements that is located on the frame is located near the end of the anchor which is not connected to the anchor.

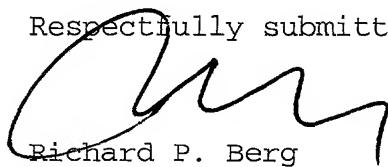
37. (Amended) A gyroscope according to Claim 19, wherein the sensed relative motion between the pair of elements is used to maintain a predetermined distance between the pair of elements.

38. (Amended) A gyroscope comprising two gyroscopes according to Claim 19, adjacent one another such that the respective pairs of elements are adapted to sense motion in collinear directions.

REMARKS

This Preliminary Amendment amends Claims 4-7, 10, 13-15, 17-18, 23, 25-26, 29, 32-33, and 36-38 so that these claims are no longer multiply dependent in order to reduce official fees. The Applicants may elect to amend Claims 4-7, 10, 13-15, 17-18, 23, 25-26, 29, 32-33, and 36-38 to make them again multiply dependent or to add additional claims to this application to provide coverage similar to, broader than, or narrower than the present claims at any time during the pendency of the above-identified U.S. application.

Respectfully submitted,



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Enclosure: Appendix A (3 pages)

**Appendix A**  
**(VERSION WITH MARKINGS TO SHOW CHANGES MADE)**

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Please amend the Claims as indicated below.

4. (Amended) A gyroscope according to Claim 2 [or 3], wherein at least one of the means to cause the proof masses to oscillate comprises at least one electrostatic oscillation actuator.
5. (Amended) A gyroscope according to Claim 2 [or 3], wherein at least one of the means to cause the proof masses to oscillate comprises at least one current-carrying element oriented in the other of the first or the second direction, a magnetic field being provided in a direction perpendicular to the first and second directions.
6. (Amended) A gyroscope according to [any preceding claim] Claim 1, wherein at least one of the connection arrangements comprises at least one suspension beam extending between the proof mass and the frame.
7. (Amended) A gyroscope according to [any preceding claim] Claim 1, wherein at least one of the constituent gyroscopes comprises an anchor, the frame of the constituent gyroscope being connected to the anchor.
10. (Amended) A gyroscope according to Claim 8 [or 9], further comprising means to vary the distance between the positioner and the frame.
13. (Amended) A gyroscope according to [any preceding claim] Claim 1, wherein one of at least one of the pairs of elements is located on the frame of the respective constituent gyroscope, the other of the at least one of the pairs of elements being located on the proof mass of the respective constituent gyroscope.

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14. (Amended) A gyroscope according to [any one of Claims 8 to 12]Claim 8, wherein one of the pair of elements on the at least one constituent gyroscope is located on the positioner, the other of the pair of elements being located on the frame of the at least one constituent gyroscope.

15. (Amended) A gyroscope according to [any preceding claim]Claim 1, wherein at least one of the constituent gyroscopes comprises a further proof mass.

17. (Amended) A gyroscope according to [any preceding claim]Claim 1, wherein the sensed relative motion between each of the pairs of elements is used to maintain a predetermined distance between the elements of each pair of elements.

18. (Amended) A gyroscope according to [any preceding claim]Claim 1, wherein the respective pairs of elements are adapted to sense motion in collinear directions.

23. (Amended) A gyroscope according to [any one of Claims 20 to 22]Claim 20, wherein the frame and the proof mass are connected to one another by the connection arrangement such that, during oscillation of the proof mass in the second direction, the proof mass suffers an angular deflection with respect to the frame.

25. (Amended) A gyroscope according to [any one of Claims 19 to 24]Claim 19, wherein one of the pair of elements comprises a quantum tunnelling sensing tip, the other of the pair of elements comprising an electrode.

**Appendix A**  
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26. (Amended) A gyroscope according to [any one of Claim 19 to 25]Claim 19, further comprising a positioner located adjacent the frame.

29. (Amended) A gyroscope according to Claim 27 [or 28], wherein means are provided to vary the distance between the positioner and the frame.

32. (Amended) A gyroscope according to [any one of Claim 26 to 31]Claim 26, wherein one of the pairs of elements is located on the positioner, the other pair of elements being located on the frame.

33. (Amended) A gyroscope according to [any one of Claims 19 to 25]Claim 19, wherein one of the pair of elements is located on the frame, the other of the pair of elements being located on the proof mass.

36. (Amended) A gyroscope according to [any one of Claims 29 to 32]Claim 29, wherein the one of the pair of elements that is located on the frame is located near the end of the anchor which is not connected to the anchor.

37. (Amended) A gyroscope according to [any one of Claims 19 to 36]Claim 19, wherein the sensed relative motion between the pair of elements is used to maintain a predetermined distance between the pair of elements.

38. (Amended) A gyroscope comprising two gyroscopes according to [any one of Claims 19 to 37]Claim 19, adjacent one another such that the respective pairs of elements are adapted to sense motion in collinear directions.